Amendments to the Claims:

This listing of claim will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended)~~In a~~A spread spectrum communication system of the type that processes one or more spread-spectrum waveforms ("user spread-spectrum waveforms"), each representative of a waveform associated with a respective user,~~the improvement~~ comprising:

a first logic element that generates a residual composite spread-spectrum waveform as a function of an arithmetic difference between a composite spread-spectrum waveform and an estimated composite spread-spectrum waveform,

one or more second logic elements each coupled to the first logic element, each second logic element generating a refined matched-filter detection statistic for at least a selected user as a function of

(i) the residual composite spread-spectrum waveform and

(ii) a characteristic of an estimate of the selected user's spread-spectrum waveform.

2. (Currently Amended) ~~In t~~The system of claim 1,~~the further improvement~~ wherein the characteristic is at least one of an estimated amplitude and an estimated symbol associated with the estimate of the selected user's spread-spectrum waveform.

3. (Currently Amended) ~~In t~~The system of claim 1,~~the improvement~~ wherein the spread-spectrum communications system comprises a code division multiple access (CDMA) base station.

4. (Currently Amended) ~~In t~~The system of claim 1,~~the improvement~~ wherein the CDMA base station comprises one or more long-code receivers, and each long-code receiver generating one or more respective matched-filter detection statistics, from which the estimated composite spread-spectrum waveform is, in part, generated.

5. (Currently Amended) ~~In t~~The system of claim 1, ~~the improvement~~ wherein the first logic element comprises summation logic which generates the residual composite spread-spectrum waveform based on the relation

$$r_{res}^{(n)}[t] \equiv r[t] - \hat{r}^{(n)}[t],$$

wherein

$r_{res}^{(n)}[t]$ is the residual composite spread-spectrum waveform,

$r[t]$ represents the composite spread-spectrum waveform,

$\hat{r}^{(n)}[t]$ represents the estimated composite spread-spectrum waveform,

t is a sample time period, and

n is an iteration count.

6. (Currently Amended) ~~In t~~The system of claim 5, ~~the further improvement~~ wherein the estimated composite spread-spectrum waveform is pulse-shaped and is based on estimated complex amplitudes, estimated delay lags, estimated symbols, and codes of the one or more user spread-spectrum waveforms.

7. (Currently Amended) ~~In t~~The system of claim 1, ~~the further improvement~~ wherein each second logic element comprises rake logic and summation logic which generates the refined matched-filter detection statistics based on the relation

$$y_k^{(n+1)}[m] = A_k^{(n)2} \cdot \hat{b}_k^{(n)}[m] + y_{res,k}^{(n)}[m]$$

wherein

$A_k^{(n)2}$ represents an amplitude statistic,

$\hat{b}_k^{(n)}[m]$ represents a soft symbol estimate for the k^{th} user for the m^{th} symbol period ,

$y_{res,k}^{(n)}[m]$ represents a residual matched-filter detection statistic for the k^{th} user, and

n is an iteration count.

8. (Currently Amended) ~~In t~~The system of claim 1, ~~the further improvement~~ wherein the refined matched-filter detection statistic for each user is iteratively generated.

9. (Currently Amended) ~~In t~~The system of claim 1, ~~the further improvement~~ wherein the refined matched-filter detection statistic for at least a selected user is generated by a long-code receiver.

10. (Currently Amended) ~~In t~~The system of claim 1, ~~the improvement~~ wherein the first and second logic elements are implemented on any of processors, field programmable gate arrays, array processors and co-processors, or any combination thereof.

11. (Currently Amended) ~~In a~~A spread spectrum communication system of the type that processes one or more user spread-spectrum waveforms, each representative of a waveform associated with a respective user, ~~the improvement~~ comprising:

a first logic element which generates an estimated composite spread-spectrum waveform that is a function of estimated user complex channel amplitudes, time lags, and user codes,

a second logic element coupled to the first logic element, the second logic element generating a residual composite spread-spectrum waveform as a function of an arithmetic difference between a composite user spread-spectrum waveform and the estimated composite spread-spectrum waveform,

one or more third logic elements each coupled to the second logic element, the third logic element generating a refined matched-filter detection statistic for at least a selected user as a function of

(i) the residual composite spread-spectrum waveform and

(ii) a characteristic of an estimate of the selected user's spread-spectrum waveform.

12. (Currently Amended) ~~In t~~The system of claim 11, ~~the further improvement~~ wherein the characteristic is at least one of an estimated amplitude, an estimated delay lag and an

estimated symbol associated with the estimate of the selected user's spread-spectrum waveform.

13. (Currently Amended) ~~In t~~The system of claim 11, ~~the improvement~~ wherein the spread-spectrum communications system is a code division multiple access (CDMA) base station.

14. (Currently Amended) ~~In t~~The system of claim 13, ~~the improvement~~ wherein the CDMA base station comprises long-code receivers.

15. (Currently Amended) ~~In t~~The system of claim 11, ~~the improvement~~ wherein the first logic element further comprises arithmetic logic which generates the estimated composite spread-spectrum waveform based on the relation

$$\hat{r}^{(n)}[t] = \sum_{r} g[r]\rho^{(n)}[t-r],$$

wherein

$\hat{r}^{(n)}[t]$ represents the estimated composite spread-spectrum waveform,

$\rho^{(n)}[t-r]$ represents an estimated composite re-spread waveform,

$g[t]$ g[r] represents a raised-cosine pulse shape.

16. (Currently Amended) ~~In t~~The system of claim 15, ~~the further improvement~~ wherein the first logic element comprises arithmetic logic which generates an estimated composite re-spread waveform based on the relation

$$\rho^{(n)}[t] = \sum_{k=1}^{K_v} \sum_{p=1}^{L} \sum_{r} \delta[t - \hat{\tau}_{kp}^{(n)} - rN_c] \cdot \hat{a}_{kp}^{(n)} \cdot c_k[r] \cdot \hat{b}_k^{(n)}[\lfloor r / N_k \rfloor],$$

wherein

K_v is a number of simultaneous dedicated physical channels for all users,

$\delta[t]$ is a discrete-time delta function,

$\hat{a}_{kp}^{(n)}$ is an estimated complex channel amplitude for the p^{th} multipath component for the k^{th} user,

$c_k[r]$ represents a user code comprising at least a scrambling code, an orthogonal variable spreading factor code, and a j factor associated with even numbered dedicated physical channels,

$\hat{b}_k^{(n)}[m]$ represents a soft symbol estimate for the k^{th} user for the m^{th} symbol period,

$\hat{\tau}_{kp}^{(n)}$ is an estimated time lag for the p^{th}th multipath component for the k^{th} user ,

N_k is a spreading factor for the k^{th} user,

t is a sample time index,

L is a number of multi-path components.,

N_c is a number of samples per chip, and

n is an iteration count.

17. (Currently Amended) ~~In t~~The system of claim 11, ~~the improvement~~ wherein the second logic element comprises summation logic which generates the residual composite spread-spectrum waveform that based on the relation

$$r_{res}^{(n)}[t] \equiv r[t] - \hat{r}^{(n)}[t],$$

wherein

$r_{res}^{(n)}[t]$ is the residual composite spread-spectrum waveform ,

$r[t]$ represents the composite spread-spectrum waveform,

$\hat{r}^{(n)}[t]$ represents the estimated composite spread-spectrum waveform,

t is a sample time period, and

n is an iteration count.

18. (Currently Amended) ~~In t~~The system of claim 17, ~~the further improvement~~ wherein the estimated composite spread-spectrum waveform is pulse-shaped and is based on the user spread-spectrum waveform.

19. (Currently Amended) ~~In t~~The system of claim 18, ~~the further improvement~~ wherein each third logic element comprises rake logic and summation logic which generates the second user matched-filter detection statistic based on the relation

$$y_k^{(n+1)}[m] = A_k^{(n)2} \cdot \hat{b}_k^{(n)}[m] + y_{res,k}^{(n)}[m],$$

wherein

$A_k^{(n)2}$ represents an amplitude statistic,

$\hat{b}_k^{(n)}[m]$ represents a soft symbol estimate for the k^{th} user for the m^{th} symbol period,

$y_{res,k}^{(n)}[m]$ represents the user residual matched-filter detection statistic for the m^{th} symbol period, and

n is an iteration count.

20. (Currently Amended) ~~In t~~The system of claim 11, ~~the further improvement~~ wherein the refined matched-filter detection statistic for each user is iteratively generated.

21. (Currently Amended) ~~In t~~The system of claim 11, ~~the improvement~~ wherein the logic elements are implemented on any of a processors, field programmable gate arrays, array processors and co-processors, or any combination thereof.

22. (Currently Amended) A method for multiple user detection in a spread-spectrum communication system that processes long-code spread-spectrum user transmitted waveforms comprising:

generating a residual composite spread-spectrum waveform as a function of an arithmetic difference between a composite spread-spectrum waveform and an estimated composite spread-spectrum waveform,

generating a refined matched-filter detection statistic that is a function of a sum of a rake-processed residual composite spread-spectrum waveform for a selected user and an amplitude statistic for that selected user.

23. (Original) The method of claim 22, comprising generating a refined matched-filter detection statistic that is a function of a sum of a rake-processed residual composite spread-spectrum waveform for a selected user and an amplitude statistic for that selected user multiplied by a soft symbol estimate.

24. (Original) The method of claim 22, further wherein the spread-spectrum communications system is a code division multiple access (CDMA) base station.

25. (Original) The method of claim 22, wherein the step of generating the residual composite spread-spectrum waveform further comprises performing arithmetic logic that is based on the relation

$$r_{res}^{(n)}[t] \equiv r[t] - \hat{r}^{(n)}[t],$$

wherein

$r_{res}^{(n)}[t]$ is the residual composite spread-spectrum waveform ,

$r[t]$ represents the composite spread-spectrum waveform,

$\hat{r}^{(n)}[t]$ represents the estimated composite spread-spectrum waveform,

t is a sample time period, and

n is an iteration count.

26. (Original) The method of claim 22, wherein the estimated composite spread-spectrum waveform is pulse-shaped and is based on a composite user re-spread waveform.

27. (Original) The method of claim 22, wherein the step of generating the refined matched-filter detection statistic representative of that user further comprises performing arithmetic logic based on the relation

$$y_k^{(n+1)}[m] = A_k^{(n)2} \cdot \hat{b}_k^{(n)}[m] + y_{res,k}^{(n)}[m]$$

wherein

$A_k^{(n)2}$ represents an amplitude statistic,

$\hat{b}_k^{(n)}[m]$ represents a soft symbol estimate for the k^{th} user for the m^{th} symbol period,

$y_{res,k}^{(n)}[m]$ represents a residual matched-filter detection statistic, and

n is an iteration count.

28. (Original) The method of claim 22, the further improvement wherein the refined matched-filter detection statistic is generated by a long-code receiver.

29. (Currently Amended) The method of claim 22, the further improvement wherein the step of generating the residual matched-filter detection statistic for an m^{th} symbol period comprises performing arithmetic logic based on the relation

$$y_{res,k}^{(n)}[m] \equiv \mathrm{Re}\left\{\sum_{p=1}^{L} \hat{a}_{kp}^{(n)H} \cdot \frac{1}{2N_k} \sum_{r=0}^{N_k-1} r_{res}^{(n)}[rN_c + \hat{\tau}_{kp}^{(n)} + mT_k] \cdot c_{km}^{*}[r]\right\}$$

wherein

$y_{res,k}^{(n)}[m]$ represents the user residual matched-filter detection statistic for the m^{th} symbol period,

L is a number of multi-path components,

$\hat{a}_{kp}^{(n)}$ $\underline{a}^{\hat{}(n)H}_{kp}$ is the estimated complex channel amplitude for the p^{th} multipath component for the k^{th} user,

N_k is the spreading factor for the k^{th} user,

$r_{res}^{(n)}[t]$ is the residual composite spread-spectrum waveform ,

N_c is the number of samples per chip, and

$\hat{\tau}_{kp}^{(n)}$ is the time lag for the p^{th} multipath component for the k^{th} user ,

m is a symbol period,

T_k is a channel symbol duration for the k^{th} user,

$c_{km}[r]$ c * km[r] represents a user code comprising at least a scrambling code, an orthogonal variable spreading factor code, and a j factor associated with even numbered dedicated physical channels.

n is an iteration count.